REMARKS

Claims 1, 4-7, 10-13 and 16-20 are pending in the present application. All claims stand rejected in the final Office Action of November 20, 2002. The Examiner's reconsideration is respectfully requested in view of the amendments made hereinabove, taken with the following remarks.

Claims 1, 4-7, 10-13 and 16-20 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. 6,258,317 (hereinafter the '317 patent). The Examiner notes that although the conflicting claims are not identical, they are not patentably distinct from each other because the alloy compositions in the instant claims are overlapped by the alloy compositions of the '317 patent. Upon allowance of the presently pending claims, Applicants may submit a Terminal Disclaimer in the present case to obviate the rejection of obviousness-type double patenting, if required.

Claims 1, 4-7, 10-13 and 16-20 stand finally rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 4,764,225 to Shankar et al., or U.S. Patent No. 3,015,558 to Grant et al.

Independent claims 1, 7 and 13 have been amended herein to positively include nitrogen in all of the claims, at a minimum amount of 0.01 wt.% (100 ppm). Claim 1 as amended now requires 0.01-0.1 N, independent claim 7 as amended now requires 0.01-0.08 N and 0-0.4 Nb, while amended independent claim 13 now requires 0.01-0.05 N and 0-0.4 Nb. Independent claim 20 continues to define a range of 0.01-0.05 N. Support for these nitrogen ranges is found in the instant specification at page 3, line 34 bridging to page 4, line 2 and in Table 1 on page 5. Entry of these amendments is respectfully requested. The Nb content of claims 7 and 13 is the same as in original claim 1 and was inadvertently omitted from claims 7 and 13. No new matter has been added.

The Present Invention

The present invention is directed to a nickel base alloy which provides high temperature and high strength applications involving corrosion-inducing environments over a complete spectrum of carburizing, oxidizing, nitriding and sulfidizing atmospheres. When optimum levels of chromium, aluminum, nitrogen and critical microalloying levels of yttrium and zirconium are present in the alloy, outstanding corrosion resistance will be achieved in this complete spectrum of carburizing, oxidizing, nitriding and sulfidizing corrosion-inducing environments. That feature, including the newly added nitrogen ranges, is present in all of the pending claims. As pointed out on page 3, line 34 bridging to page 4, line 2 of the instant application, nitrogen in an amount of at least 0.01 wt.% stabilizes the oxide scale and serves to increase oxidation resistance. Nitrogen in excess of 0.1 wt.% deteriorates the mechanical properties of the alloy. Hence, the broad range of 0.01 to 0.1 wt.% nitrogen as well as its beneficial function is fully disclosed in the application as filed.

As pointed out on page 3, lines 30-32 of the instant specification, maximum overall corrosion resistance to carburizing, oxidizing, nitriding and sulfidizing environments is achieved by a combination of alloy constituents containing at least 2.75 wt.% Al, 0.01 wt.% Zr and 0.01 wt.% Y along with the optimum amount of chromium. The addition of 0.01-0.1 wt.% N further optimizes oxidation resistance. These limitations are present in all pending claims.

An addition of 21.5-27 wt.% chromium as required in claim 1 imparts oxidation resistance to the alloy. Chromium levels less than 21.5 wt.% are inadequate for oxidation resistance, while levels above 27 wt.% chromium can produce detrimental chromium-containing precipitates. The instant specification points out that an addition of 4.5-9.5 wt.% molybdenum contributes to stress corrosion cracking resistance and contributes solid solution strengthening to the matrix of the material. Aluminum in an amount ranging

from 2-3.5 wt.% contributes to oxidation resistance and precipitates as γ' phase to strengthen the matrix at intermediate temperatures. As pointed out above, aluminum contents of at least 2.75 wt.% provide maximum oxidation resistance.

It is also critical in the present invention for sulfidization resistance that the alloy contain a minimum of 0.01 wt.% zirconium to stabilize the scale against inward migration of sulfur through its protective layer. Zirconium additions above 0.6 wt.% adversely impact the alloy's fabricability. Advantageously, an addition of at least 0.005 wt.% and, more preferably, at least 0.01 wt.% yttrium improves both oxidation and nitridation resistance of the alloy and is critical to establish carburization resistance. The present specification further points out that yttrium levels above 0.1 wt.% increase the cost and decrease the hot workability of the alloy. When the claimed optimum levels of chromium, aluminum and critical microalloying levels of yttrium and zirconium are present, the balanced outstanding corrosion resistance is achieved and corrosion resistance in the complete spectrum of carburizing, oxidizing, nitriding and sulfidizing environments is obtained. Clearly, no such combination of properties or critical ranges is taught or suggested in any of the cited prior art.

Shankar et al. - U.S. Patent No. 4,764,225

Shankar et al. has been used as a reference in rejecting claims 1, 4-7, 10-13 and 16-20 under 35 U.S.C. §102(b) or, in the alternative, under 35 U.S.C. §103.

Clearly, as amended, the present claims are not anticipated by Shankar et al. All of the claims now require at least 0.01 wt.% (100 ppm) nitrogen to optimize the oxidation resistance of the alloy. Shankar et al. fails to disclose nitrogen at any level in its alloys.

Removal of Shankar et al. as a ground of rejection under 35 U.S.C. §102(b) is proper in light of the present amendment.

Since Shankar et al. fails to disclose the presence of nitrogen in its alloy composition, there can be no overlapping of the claimed nitrogen content in the present claims. At the levels now claimed, i.e., N≥ 0.01 wt.%, the nitrogen must be intentionally added to the alloy, and Shankar et al. fails to disclose or suggest such an addition. Because there is no disclosure of nitrogen, there is no overlapping of nitrogen contents. Accordingly, there can be no basis for establishing *prima facie* obviousness over Shankar et al. Hence, the rejection under 35 U.S.C. §103 over Shankar et al. is improper and should be withdrawn.

Grant et al. - U.S. Patent No. 3,015,558

Grant et al. has been applied in rejecting all of the pending claims under 35 U.S.C. §102(b) or, in the alternative, under 35 U.S.C. §103.

Grant et al. discloses a broad Cr content range of "about 28-45%" (col. 2, lines 7-8) and a preferred range of "about 30-40% chromium" (col. 2, lines 24-25).

Applicants' pending independent claims 1, 7, 13 and 20, respectively, specify 21.5-27 wt.% Cr (claims 1 and 7), 22-27 wt.% Cr (claim 13) and 22-26 wt.% Cr (claim 20). None of these ranges falls within the expressly enumerated Cr ranges set forth in Grant et al. It is mere conjecture to use the word "about" to extend the lower Cr contents of 28% or 30% disclosed by Grant et al. into the upper range limits of 27% or 26% set forth in the instant claims. It must be reiterated that the present claims do not use the word "about" in connection with the claimed Cr ranges. Such conjecture in extending the express Cr ranges of Grant et al. based on the word "about" is unwarranted. Accordingly, withdrawal of the rejection under 35 U.S.C. §102(b) over Grant et al. is deemed proper and the Examiner's reconsideration is respectfully requested.

The Examiner has taken the position in paragraph 14 of the Office Action of November 20, 2002, that Grant et al.'s teaching of "about 28%" Cr "reads on the claimed 26 and 27 wt.%." The Examiner goes on to state that: "The wording 'about' allows up to 10% difference", citing *In re Preda*, 159 U.S.P.Q. 342 (CCPA 1968) and *In re Ayers*, 69 U.S.P.Q. 109 (CCPA 1946) in support of that position.

A careful reading of the above-cited cases fails to support the Examiner's position regarding use of the word "about". More specifically, in *In re Preda*, the prior art Thacker reference disclosed catalytically reacting methane (a gaseous hydrocarbon) with sulfur vapor at 800-1000°C to produce carbon disulfide and that activated charcoal may be used as a catalyst. The main claim on appeal (claim 7) defined a process for producing carbon disulfide from sulfur vapor and gaseous hydrocarbon by reacting those constituents in contact with charcoal as a catalyst at a temperature of about 750°-830°C. The appellate court affirmed the Board's rejection of claim 7 without any discussion of the word "about" or the "10%" allowance opined by the Examiner.

In re Ayers, likewise, fails to support the Examiner's position that... "the wording 'about' allows up to 10% difference." In the *In re Ayers* decision, the phraseology of the claim limitation under consideration was: "...restricting the supply of air so that the gases within the heating zone contain at least about 10% of combined sulfur trioxide and sulfur dioxide", (emphasis supplied) 69 U.S.P.Q. at 112. The Court noted that the term "about" as used in the appealed claim evidently permits some tolerance in the limitation so as to read on the prior art which disclosed "about 8%".

Of critical distinction is the fact that the claim under appeal in *Ayers* contained the modifier "about", as did the prior art. The present claims do not contain the "about" language as in *Ayers*, only Grant et al. uses "about". In addition, *In re Ayers* clearly does not support the Examiner's position that the word "about" allows up to a 10% difference. The

recitation of "10%" is merely language found in the appealed claim concerning the particular concentration of gases therein.

It is, therefore, submitted that the Examiner has no legal basis for employing the "about 28-45% Cr" range of Grant et al. as anticipating Applicants' claimed ranges of 21.5-27% Cr (claims 1 and 7), 22-27% Cr (claim 13) or 22-25% Cr (claim 20). If such a rule were applied, it is unlikely that many alloy patents would issue in the future.

The Examiner states in paragraph 9 of the Office Action of November 20, 2002: "...the claimed N contents (in claims 7 and 13) read on trace or impurity amount(s) that would diffuse into the alloy during casting...". The N levels in claims 7 and 13 (and claim 1) have been amended and now require at least 0.01 wt.% N, which is not a trace amount. Claim 20, which previously contained a nitrogen range of 0.01-0.05 wt.% (100-500 ppm) was not considered by the Examiner in the last Office Action and, accordingly, it appears that the final rejection of claim 20 is improper since that claim seemingly was not considered on the merits.

The pending claims now specifically require specific additions of nitrogen for the purpose of enhancing oxidation resistance. Grant et al. merely mentions in passing in col. 2, lines 37-41 that nitrogen may be optionally added but at no specific amount and for no particular purpose. In the paragraph bridging columns 9 and 10, Grant et al. discloses:

> "If carbon or nitrogen is present in relatively small amounts, it is expected that carbides and nitrides or carbonitrides can appear in the structure without materially affecting the aging process or the resultant properties."

Hence, Grant et al. fails to teach or suggest that any beneficial effect (oxidation resistance) can be realized with the intentional addition of nitrogen at the claimed levels. Clearly, the amended claims represent a patentable advance over Grant et al.

The Examiner notes in paragraph 6 of the Office Action of November 20, 2002, that the subject matter of the present invention would have been obvious "to have selected the overlapping portion of the subject matter disclosed by the reference." This appears to be possible only by improper hindsight reconstruction. There are literally thousands of possible alloy compositions that may be formulated based on the disclosure of Grant et al. In addition to the difference in the critical Cr content, Grant et al. has at least seven optionally added elements of which Applicants' claimed alloy requires, *viz.*, Co, Mo, Ti, Y, Zr, C and N. Surely, such a vast array of possible compositional combinations cannot reasonably suggest the presently claimed invention.

The Examiner's reconsideration and favorable action are respectfully requested in light of the amendments made herein taken with the above remarks.

Respectfully submitted,

WEBB ZIESENHEIM LOGSDON
ORKIN & HANSON, P.C.

By _____

Kent E. Baldauf
Registration No. 25,826
Attorney for Applicants
700 Koppers Building
436 Seventh Avenue
Pittsburgh, PA 15219-1818
Telephone: 412-471-8815
Facsimile: 412-471-4094

MARKED-UP VERSION OF THE CHANGES MADE

IN THE CLAIMS:

Claims 1, 7 and 13 have been amended as follows.

1. (Five Times Amended) A nickel-base alloy resistant to carburizing, oxidizing, nitriding and sulfidizing environments, consisting of, in weight percent, 42 to 58 nickel, 21.5 to 27 chromium, 12 to 18 cobalt, 4.5 to 9.5 molybdenum, 2 to 3.5 aluminum, 0.05 to 2 titanium, 0.005 to 0.1 yttrium and 0.01 to 0.6 zirconium, 0.01 to 0.15 carbon, 0 to 0.01 boron, 0 to 4 iron, 0 to 0.4 manganese, 0 to 1 silicon, 0 to 1 hafnium, 0 to 0.4 niobium, [0] 0.01 to 0.1 nitrogen, incidental impurities and deoxidizers.

7. (Four Times Amended) A nickel-base alloy resistant to carburizing, oxidizing, nitriding and sulfidizing environments, consisting of, in weight percent, 43 to 57 nickel, 21.5 to 27 chromium, 12.5 to 17.5 cobalt, 4.5 to 9 molybdenum, 2.25 to 3.5 aluminum, 0.06 to 1.6 titanium, 0.01 to 0.08 yttrium and 0.01 to 0.5 zirconium, 0.01 to 0.14 carbon, 0.0001 to 0.01 boron, 0 to 3 iron, 0 to 0.4 manganese, 0.01 to 1 silicon, 0.01 to 0.8 hafnium, 0-0.4 niobium, [0.00001] 0.01 to 0.08 nitrogen, incidental impurities and deoxidizers.

13. (Four Times Amended) A nickel-base alloy resistant to carburizing, oxidizing, nitriding and sulfidizing environment, consisting of, in weight percent, 44 to 55 nickel, 22 to 27 chromium, 13 to 17 cobalt, 5 to 8.5 molybdenum, 2.5 to 3.5 aluminum, 0.08 to 1.2 titanium, 0.01 to 0.07 yttrium, 0.02 to 0.5 zirconium, 0.01 to 0.12 carbon, 0.001 to

0.009 boron, 0.1 to 2.5 iron, 0 to 0.4 manganese, 0.02 to 0.5 silicon, 0 to 0.7 hafnium, 0-0.04 niobium, [0.0001] 0.01 to 0.05 nitrogen, incidental impurities and deoxidizers.